invensys

NUCLEAR QUALIFIED PRODUCTS

TRICONEX TOPICAL REPORT

7286-545-1-NP, Revision 1

(Non-Proprietary Version)

Non -Proprietary copy per 10CFR2.390
- Areas of proprietary information have been redacted.
- Designation letter corresponds to Triconex proprietary policy categories (Ref. transmittal number TCXNRC-09-01, Affidavit, Section 4.)

QUALIFICATION SUMMARY REPORT

NUCLEAR QUALIFICATION OF TRICON TRIPLE MODULAR REDUNDANT PLC SYSTEM

Revision of Triconex Topical Report 7286-545-1-A
(ADAMS Accession # ML020730573)

Issue Date: August 31, 2009

Table of Contents

PART 1 ABSTRACT

PART 2 DESCRIPTION OF DIFFERENCES BETWEEN V9 AND V10

PART 3 EQ SUMMARY REPORT 9600164-545, Rev 3

PART 4 APPENDIX A to EQ SUMMARY REPORT (Compliance Traceability Matrix)

PART 5 APPENDIX B to EQ SUMMARY REPORT (Application Guide)

PART 6 APPENDIX C to EQ SUMMARY REPORT (Evaluation of IEEE 323-2003)

ABSTRACT

REVISION 1 TO TRICONEX TOPICAL REPORT 7286-545-1-A

The Invensys TRICON TMR PLC platform (Version 9) was originally qualified and approved by the NRC for use in safety related nuclear applications on December 12, 2001 (ADAMS Accession Number ML013470433). Triconex Topical Report 7286-545-1-A was issued on March 8, 2002 (ADAMS Accession Number ML020730573).

This Topical Report revision reflects the successful completion of all testing and documentation requirements of TR-107330 for Version 10 (V10) of the TRICON TMR PLC platform, which is an evolutionary upgrade to Version 9 (V9). This Topical Report revision includes the Equipment Qualification Summary Report for the TRICON V10 and a synopsis of the differences between the TRICON V9 System and the TRICON V10 System.

The Equipment Qualification Summary Report describes the methods employed to qualify Version 10 of the TRICON fault tolerant PLC against the established TR-107330 requirements. The report includes:

- a description of the TRICON product capabilities and history
- a description of the TRICON test specimen and the testing methods
- a description of qualification test acceptance criteria and results
- evaluation of Triconex quality assurance and so the development processes
- evaluation of TRICON safety-critical software integrity
- evaluation of TRICON reliability, failure modes, and radiation withstand capability
- traceability to documentation and data supporting the conclusions of this report

The completed qualification tests and the specified engineering evaluations have successfully demonstrated the suitability of the TRICON V10 system to perform with high reliability in a nuclear power plant environment. As reported, analysis of test data finds the TRICON acceptable for use as a generic digital platform which can be used in a broad range of safety-related applications in nuclear power plants. The report identities the nuclear qualified TRICON modules and provides data on their qualification envelopes. Specific guidance is provided for developing nuclear power plant applications, including hardware selection, design approaches, and development of application programs.